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DEVOTED TO THE INTERESTS OF TEXTILE CHEMISTRY
BLEACHING ◆ DYEING ◆ FINISHING ◆ PRINTING

VOLUME 27 | MARCH 7, 1938 | NUMBER 5

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OFFICIAL PUBLICATION OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

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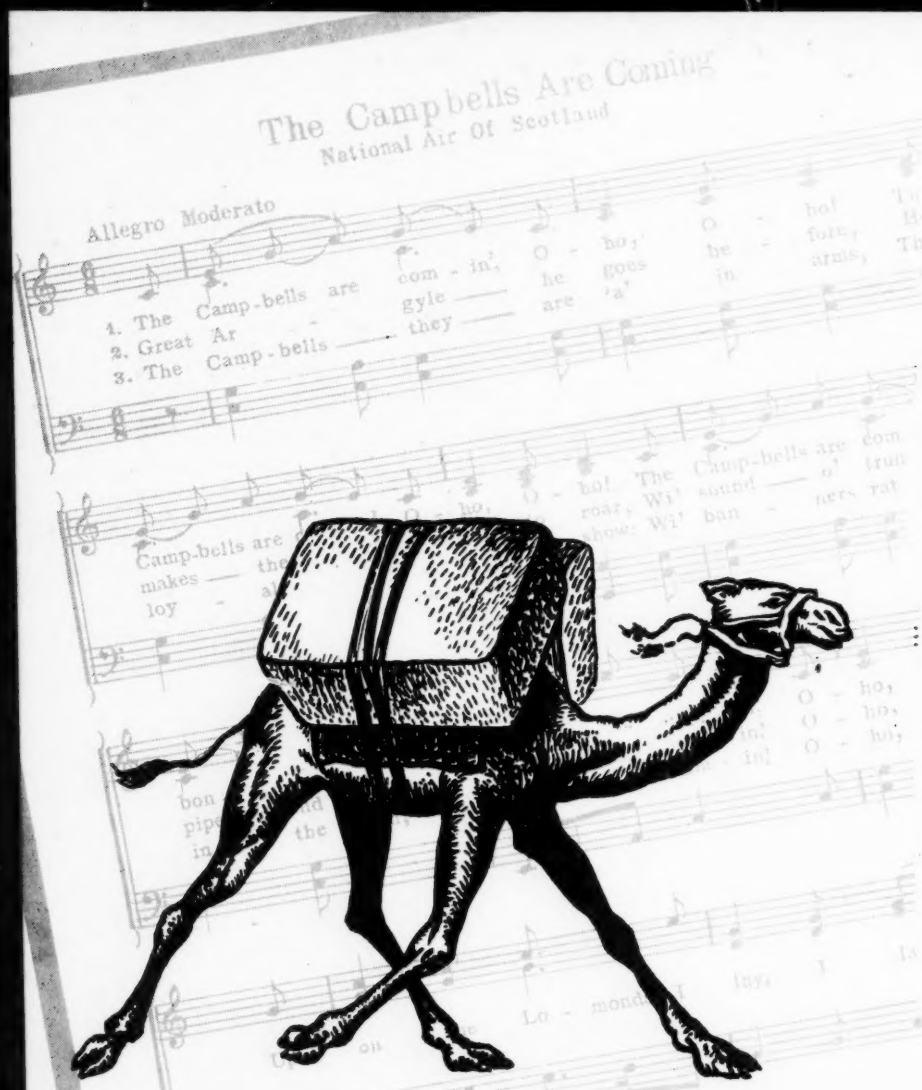
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2. Great Ar - gyle —— he goes in
3. The Camp-bells —— they —— are 'a'

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DEVOTED TO THE INTERESTS OF TEXTILE CHEMISTRY
• BLEACHING • DYEING • FINISHING • PRINTING •
AND THE NECESSARY MECHANICAL EQUIPMENT

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VOLUME 27 | MARCH 7, 1938 | NUMBER 5

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Official Publication of the American Association of Textile Chemists and Colorists

THE OBJECTS OF THIS ASSOCIATION ARE:

"To promote increase of knowledge of the application of dyes and chemicals in the Textile Industry.

"To encourage in any practicable way research work on chemical processes and materials of importance to the Textile Industry.

"To establish for the members channels by which the interchange of professional knowledge among them may be increased."

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NATIONAL DYES

AMERICAN
DYESTUFF REPORTER

VOLUME 27 MARCH 7, 1938 NUMBER 5

Value of Textile Education to the Textile Industry*

LOUIS A. OLNEY

THE subject of Textile Education is one which has absorbed most of my time and attention for more than forty years. My work along this line has been extremely interesting and I am sure that textile education in Canada will prove of equal interest to those who may have a part in its development. It is necessarily of great importance to those who receive its benefits in the form of instruction, but after all the ones who gain the greatest benefits from textile education are the textile manufacturers and distributors themselves, a point which I hope to make clear during the course of my remarks.

There are at least six well defined phases of textile education.

1. The apprentice system including what might be called the semi-apprentice system.
2. The trade and vocational school idea.
3. The technical school specializing on the requirements of the textile industry.
4. The educational features of associations like the Society of Dyers & Colourists in England, your own Association here in Canada, and the American Association of Textile Chemists and Colorists in the United States.
5. The educational value of articles published in certain journals.
6. The educational value of textile research.

SYSTEMATIC TEXTILE EDUCATION IS ESSENTIAL

The whole subject of textile education involves certain complications and the human element introduces a few difficulties. For instance one has to deal with the ultra practical man who can see no value in textile education, believing it is a waste of time and preferring to hire young men who have had no technical training whatever. On the other hand there is the man who expects rather too much of recent graduates of educational institutions and is greatly disturbed because they cannot immediately solve a lot of his complicated problems.

We always have had, and probably always will have, in our midst, the man who boasts that he is "self made" (whatever that may indicate) and who contends that much time spent in securing an education is not only a waste of time but may even prove to be an encumbrance. He is perfectly honest in his belief and any attempt to convince him that he might be even a little bit wrong would be futile.

It cannot be disputed that many men have been highly successful in connection with the Textile Industry who have had little if any education. Men who possessed natural capability, particularly along the mechanical line, and the ability to systematize and organize their thoughts and actions even though they had but little academic or scientific education, became quite efficient mill men after a few years of experience, in what they were pleased to characterize as the "School of Hard Knocks".

However, be this as it may, the extravagant losses, economic wastes, and colossal blunders that have come about in Industry through unconscious ignorance and lack of education would, if they could be measured, prove to be appalling.

Furthermore, could we suddenly place the man who was highly successful under the conditions of fifty or sixty years ago, with its long hours, its wasteful handling of materials, and in many cases but little competition, into the present era of highly organized methods of cost finding, efficient management and keen competition, he would in most cases be likely to fall down completely, at least until he had secured sufficient education to fit him for his position.

In other words, fifty years ago there was so little known about scientific management or even the fundamentals of scientific manufacturing that one could quite readily pick up all that was absolutely necessary as he came along. Today, however, the situation is quite different. There are so many highly important things known, and so many that must be learned that if one would secure a position of any importance, say nothing of holding it, the only

*An address presented at the Annual Meeting of the Ontario Section of the Canadian Association of Textile Colourists and Chemists, at Hamilton, Ontario, Canada, February 5, 1938.

way to get it and save time is via the road of a systematic education.

THE APPRENTICE SYSTEM

The apprentice system may be said to go back to the beginning of industry. In the earlier days if a young man expected to become skilled in any branch of the textile industry he was taken on as an apprentice and in most cases, without pay for a certain period of time. In fact this was looked upon as a form of schooling. In many cases the apprentice found it good policy to pay his immediate boss a regular gratuity during the period of his apprenticeship. During recent years this form of apprentice system has for the most part been abandoned because no reputable plant at the present time expects a young man to work a number of years without any pay and in many cases Legislation makes it illegal. As far as remuneration of the boss is concerned, that is a man to man affair. It was not so many years ago that the boss dyer of a large textile plant in New England regularly had one or more young men working under him who paid him well for the privilege. As far as I know this procedure is not at all prevalent at the present time. We do have however a modified form of apprenticeship which I have already mentioned as the semi-apprentice system. There are a number of large textile plants in the States that have a well organized system of plant training combined with instruction. This procedure varies somewhat and I will give two specific illustrations.

In one case two to four men are taken on each year with the understanding that they will have a definite training for two years and will be expected to remain with the company for a similar period of time after the training is completed. For the first six months they usually work in the laboratory and this is followed by several months experience in each of the more important departments of the plant. This company takes on for this system of training only graduates of colleges or of reputable textile schools.

Another plant carries on a somewhat similar course of training but combines with it a certain amount of actual classroom instruction conducted by certain men in the plant qualified for such work.

One advantage of this system is that the management has an opportunity to size up the ability of the men in training and if they measure up to their standards they are finally located in the positions for which they are best suited and are encouraged to remain with the company.

TRADE AND VOCATIONAL SCHOOL IDEA

A trade school is an organized development of the apprentice system. It is based on the idea that it is more efficient and economical to teach, for example, a reasonably large number how to weave and design fabrics than to attempt the same training with only one or two individuals. The vocational school in theory goes farther than the trade school in that it attempts to combine with the straight operational training something in regard to the whys and wherefores of the mechanical process.

The trade school has proved to be a valuable factor in the development of a number of industries, and, to a certain extent, the textile industry; but advocates of the trade school in connection with the textile industry have not always taken into consideration the following facts. First, that the educational requirements of all industries are not equally adaptable to the trade school idea; second, that all departments of the same industry may not profit to the same extent by this type of education; and third, that valuable as trade school education may be to any particular industry, technical education as applied to the same industry may be equally valuable and much more effective in the industries development.

In this connection it may be said that the conception of the general public as to what constitutes a trade school is quite varied. In the minds of some, any school that teaches something of value to any particular industry is a trade school. In accordance with this interpretation alone, some of our highest grade technical schools would be classed as trade schools. In the minds of others a trade school is an institution which actually teaches one to perform some more or less skilled manufacturing operation or craftsman work in order that the student may be able to secure a job without going through a long apprenticeship.

The real trade school, in truth, lies somewhere between these two conceptions. In many instances admission may be obtained directly upon graduation from the grammar school, and while in most instances the student specializes upon some more or less skilled occupation, he is taught, at least in an elementary way, such subjects, of a scientific and mechanical nature, as will be of assistance to him in the more intelligent grasping of the general principles involved in the special industry or trade that he is studying.

TRADE SCHOOLS AS APPLIED TO TEXTILES

As applied to the textile industry a pure and simple trade school would teach prospective operatives to card, spin and weave, and would not graduate them until they were competent to accept positions in the mills. In the same manner a trade school would supposedly teach those who wished, to dye and finish cloth, but this undertaking immediately involves complications that do not arise in the first instance. Carding, spinning and weaving are largely mechanical operations, for if the card, mule and loom are in the proper condition the process goes on more or less automatically, the chief function of the operative being to see that the raw material is properly added and the manufactured material carefully removed from the machine, and also of course to correct any irregularities of the process which may occur through breakage of the yarn or other disturbance of the stock. In the dyeing and finishing operations, on the other hand, the mechanical treatment is only one of many considerations. There is also involved the proper choice of dyes and chemicals, decision as to the length of time necessary to properly carry out the operation, proper temperatures to use, and sufficient knowledge and experience to know when the operation should cease. Furthermore, the whole series of operations and treatments may be entirely different one day from those of the day before, and must often be completely changed upon short notice to suit different types of material. An-

other serious difficulty which would arise in the case of a trade school for dyeing and finishing would be the expense of the stock and material used. Yarns and undyed cloth manufactured in such a school could be made of a more or less staple type, and could readily be disposed of, at least at such prices as would cover cost of the raw stock; but the smallest possible dyeing and finishing department, if equipped on the same scale as the manufacturing departments of such a school, could put through in a week all the material the remainder of the school could manufacture in a year. Furthermore, any attempt to give a thorough training on full size machines would involve so many kinds of material, and result in so much expense, as to be prohibitive.

THE TECHNICAL SCHOOL

The modern idea of a textile school is a high grade technical college which specializes in the requirements of the textile industry. There are a number of such institutions today and for the most part they have been the result of a more or less systematic development during the past 50 years.

In England Prof. J. J. Hummel will always be looked upon as a pioneer in textile education at least as far as textile chemistry and dyeing is concerned. He took charge of the Dyeing Department of the Yorkshire College at Leeds at the time of its inception in 1879. His original working outfit consisted of a building scarcely more than a shed, and equipment of the crudest type, but from this humble beginning he developed, by the time of his death in 1902, what was a well established textile school.

Many of the early students of textile chemistry and dyeing are familiar with Hummel's book entitled "The Dyeing of Textile Fabrics", which was for many years the only book upon this subject printed in English, of any value to students. This book was translated into four foreign languages, and is now entitled to the position of a classic in the literature of textile chemistry and dyeing.

The practical value of this type of education was thoroughly demonstrated by Hummel, and his accomplishment was the forerunner of similar schools at Bradford and Manchester, and eventually led to the establishment of textile courses in smaller institutions throughout England and Scotland. Textile schools were organized at an early date in both Germany and France. The first textile school in the United States was established at Philadelphia in 1887.

My knowledge in regard to textile education has come very largely through my connection with the Lowell Textile Institute for a period of forty years, also through an association with some seventy assistant professors and instructors who have faithfully served for various lengths of time in the Chemistry and Dyeing Department, and finally through my observation of the successes, and in some instances failures, of many hundreds of graduates who have for the most part gone into the textile or allied industries.

From the very beginning the idea of a high grade technical school rather than a trade school was foremost in our minds but during the earlier days it often required considerable diplomacy to maintain our convictions. As time went on we became more and more convinced that a thorough training involving chemistry, physics and mathematics, with the study of the composition and properties of the fibers, dyes, chemicals and other materials used, will accomplish more towards the development of an efficient and intelligent dyer and finisher than an indefinite period of time blindly spent over a dye tub or scouring machine.

DEVELOPMENT OF THE LOWELL TEXTILE INSTITUE

It has been the constant aim of those in charge, of the Lowell Textile Institute to make it the most complete and highest grade institution of its kind. Whether we have succeeded or not of course is another matter. When started in 1897 we allowed grammar school graduates to enter and take our day course which then required only three years. We gradually raised the entrance standards and in about ten years required a previous High School training. In 1916 we increased the regular course to four years and raised our admission standards to conform with standard college requirements. At that time we were authorized by the Massachusetts Legislature to grant the Bachelor's Degree. In 1935 we were authorized to grant the Master's Degree for Post-Graduate work.

The tendency particularly in the Chemistry and Dyeing Department of the Lowell Textile Institute has been away from a greater to a lesser number of hours spent in actual use of dyeing machines and to an increased number of hours of work in the more advanced study of chemical subjects and additional time spent in microscopy, report writing, textile literature, textile marketing and plant management. To many, particularly at first thought, this appears to be working in the wrong direction, but when one takes time to think the situation through, the reasons have a sound foundation. In the first place the actual running of a dyeing machine is a simple matter that a man of ordinary intelligence can learn in a few hours or at the most in a few days. It is more important to know what is going on chemically within the dyebath; to understand the causes of uneven dyeing and the methods of correcting such trouble. The comprehension of all this comes only after years of study and the application of the facts thus learned. Furthermore, every ambitious student has a dream of some day becoming the directing head of a large plant in which case he should certainly know something about plant management and it is a fact that about half of the graduates of an Institution like the Lowell Textile Institute go into the distributing end of the textile and dyestuff industries, hence the desirability of a thorough course in textile marketing.

Textile education at the Lowell Textile Institute may be said to have passed through the experimental stage and entered a period of more stabilized development.

During the early days it was not at all clear as to just what studies would be most valuable to the student, and on the other hand, most desirable as far as the textile manufacturer was concerned. There were too many con-

flicting opinions, and our experience finally convinced us that too much weight could not be given to the student's views of what *he wanted* to study, or his parents' views of what *they believed* he should study. It was not until we built up a more or less rigid curriculum, and insisted upon its being followed that much headway was made in the development of textile education of a real technical character.

At this point, a printed tabulation of the curriculum of the four-year course in Chemistry and Textile Coloring at the Lowell Textile Institute was passed to the audience and explained.

LOWELL TEXTILE INSTITUTE

Course IV—Chemistry and Textile Coloring

FIRST YEAR

First Term

(Common to all Courses)

	Hours of Exercise
Elementary Chemistry C-10	105
English E-10	45
Mathematics B-10	60
Mechanical Drawing B-13	135
Physics B-11	75
Physical Education	30
Textile Design and Cloth Analysis D-10	75

Second Term

Elementary Chemistry C-10	75
Elementary German E-11	30
English E-10	45
Machine Drawing B-13 or B-13a	45
Mathematics B-10	60
Mechanism B-12	60
Physical Education	30
Qualitative Analysis C-11 or C-11a	150
Stoichiometry C-12	30
Textile Design and Cloth Analysis D-10	—

For second-term subjects in Courses I, II, and III, see pages 21, 23, 25.

SECOND YEAR—FIRST TERM (HOURS OF EXERCISE)

Advanced German E-21	45
Adv. Organic Chemistry C-22	30
English E-20	30
Mathematics B-20a	60
Physics B-23	65
Power Weaving D-23	15
Quantitative Analysis C-23	130
Stoichiometry C-24	15
Textile Chemistry and Dyeing Lab. C-21	90
Textile Chemistry and Dyeing Lect. C-20	45

SECOND YEAR—SECOND TERM

Advanced German E-21	45
Adv. Organic Chemistry C-22	30
English E-20	30
Physics B-23	65
Quantitative Analysis C-23	150
Stoichiometry C-24	15
Textile Chemistry and Dyeing Lab. C-21	145
Textile Chemistry and Dyeing Lect. C-20	45

THIRD YEAR—FIRST TERM

Adv. Organic Chemistry Lect. C-34	15
Adv. Textile Chemistry and Dyeing Lab. C-32	135
Adv. Textile Chemistry and Dyeing Lect. C-32	30
Economics E-30	45
Physical Chemistry C-33	45
Quantitative Analysis C-30	150
Technical German C-35	30
Woolen and Worsted Finishing H-30	75

THIRD YEAR—SECOND TERM

Adv. Textile Chemistry and Dyeing Lab. C-32	90
Adv. Textile Chemistry and Dyeing Lect. C-32	15
Economics E-30	45
Industrial Chemistry C-31	30
Organic Laboratory C-36	90
Physical Chemistry C-33	45
Quantitative Analysis C-30	105
Technical German C-35	30
Woolen and Worsted Finishing H-30	75

FOURTH YEAR—FIRST TERM

Adv. Textile Chemistry and Dyeing Lab. C-44	75
†Adv. Textile Chemistry and Dyeing Lect. C-44	30
Chemical Textile Testing C-43	45
Colloid Chemistry C-50	30
Industrial Chemistry C-42	30
Microscopy and Photomicroscopy C-45	60
*Options or Thesis C-52	90
Organic Laboratory C-41	75
Quantitative Analysis C-46	15
Report Writing C-47	15
Technical German C-40	30
Textile Marketing B-42	30

FOURTH YEAR—SECOND TERM

Advanced General Chemistry C-49	30
Adv. Textile Chemistry and Dyeing Lab. C-44	120
Adv. Textile Chemistry and Dyeing Lec. C-44	15
Chemical Textile Testing C-43	45
*Options or Thesis C-52	90
Organic Laboratory C-41	105
Rayon Manufacturing C-51	30
Seminar in Business English E-40	15
Technical German C-40	30
Technology of Wool Manufacture Fibers G-50	15
Textile Literature C-48	30

†Textile Printing and Cotton Finishing are included in Advanced Textile Chemistry and Dyeing.

*Options or Electives—Advanced Microscopy, Advanced Physical Chemistry, Advanced Preparative Chemistry, Microbiology, Colloid Chemistry Laboratory, Photomicroscopy.

EVENING COURSES AT LOWELL

In any development of textile education, the evening school should play an important part. At Lowell we have this year approximately 270 in the day school, but our registration for evening classes was well over 2,000.

The evening school is largely for those who work in the mills during the day time. For the most part the work is simpler and not as complete as the work given in the day school. There are many one and two year courses most of which may be taken independently of each other. The chief object of an evening school is to give to young men of ambition the opportunity to study such branches of science as may give them a better understanding of their daily tasks in the mill. In its special sphere, the evening school is just as valuable as the day school, and of course benefits a far greater number.

FEIKER'S SURVEY OF TEXTILE EDUCATION

No discussion of textile education would be complete without reference to the study made by Frederick M. Feiker, under the direction of the Textile Foundation, Washington, D. C. The result of this investigation which occupied more than a year's time has been published under the title "The Training of Men for the Textile Industry". It can be procured through the Textile Foundation for $1.00 and it certainly will prove to be valuable and interesting reading to anyone who is interested in any phase of textile education. Mr. Feiker made a thorough study of the curriculum of seven of the educational institutions in the United States that give four year courses along textile lines leading to the Bachelor Degree. He not only secured the ideas of the faculty and instructing staffs of these institutions but interviewed many of the leaders in the industry and also graduates of these institutions who had been out several years.

It was gratifying to note when this report was published that its findings and recommendations, at least as

far as the higher schools of textile education were concerned, were almost identical with the policy which had been pursued by the Lowell Textile Institute over a period of years.

Great credit should be given to the Directors of the Textile Foundation for the interest they have taken in textile education, not only in the preparation of Mr. Feiker's Report, but in many other ways. They have organized and completely financed a system of bringing together at regular intervals, once or twice a year, all of the heads of textile schools in the United States for a several days conference. This is doing much to unify and secure the adoption of the very best procedures in textile education and the gradual elimination of inefficient and obsolete methods. The Textile Foundation has also supported a very extensive program of textile research and for several years has generously supported the research program of the American Association of Textile Chemists and Colorists making it possible for the association to carry on more or less continuously a systematic program of research work.

INCEPTION OF TEXTILE FOUNDATION

For those who are not acquainted with the history of the Textile Foundation, a brief explanatory statement might be of interest. During the World War an organization known as the Textile Alliance was formed for the purpose of bringing reparation dyes into the United States. To provide against the possibility of any individual or group of individuals profiting from such a sale of dyes this so called Textile Alliance was formed with the sanction of the U. S. Government and it was definitely agreed that any profit which might arise from these transactions should eventually be used for scientific purposes. Without going into the many details of this arrangement, it resulted in the profit and accumulation of well over a million and a half dollars, a portion of which was finally distributed to a number of educational institutions for special research work and the balance of approximately a million and a quarter dollars, was by Act of Congress eventually turned over to an organization known as the Textile Foundation. This body was authorized through its trustees to expend the income and principal, if thought desirable, for purposes strictly in accordance with the original agreement made by the Textile Alliance. There are five trustees of the Foundation two of whom according to law are the Secretary of Commerce and the Secretary of Agriculture, the three remaining trustees are appointed by the President.

Mr. Franklin W. Hobbs has been chairman of the Textile Foundation since its inception about eight years ago. The other members appointed by the President are Stuart W. Cramer and Frank D. Cheney, all three of whom have been prominent in the textile industry. Mr. Edward T. Pickard, who has been closely allied with the Government for many years as a textile expert in the Department of Commerce has acted as Secretary of the Foundation since its organization.

EDUCATIONAL VALUE OF TECHNICAL ASSOCIATIONS

Passing along to the educational value of technical associations like yours, here in Canada, and the American Association of Textile Chemists and Colorists in the United States; in the first place the majority of papers presented before such associations have a decidedly educational value and the opportunity for free discussions of them often presents even a greater opportunity to increase one's knowledge of the subject under consideration. The whole atmosphere of such an association has a tendency to develop an educational trend and I believe you will agree that the selection of the subject for this afternoon's discussion is very positive evidence of that fact. I do not know what provisions the Canadian association makes for Junior and Student members but some of our most valuable active members of today were Junior members during the early days of the Association. We now have three active student sections located at different textile schools and these present a very definite educational opportunity through talks which are given to the students from time to time chiefly by men connected with the industry. It is our experience that efforts made to encourage young men to participate in the association's activities result advantageously both to the association and to the young men themselves.

TEXTILE JOURNALS

Textile journals can and should be active educational agencies and might well devote considerable space to articles which are instructive. The editorial matter should be systematically planned so as to include, over any period of time, a reasonable number of articles that are fundamentally educational. Your own Canadian Textile Journal and our AMERICAN DYESTUFF REPORTER, being so closely allied with the two associations, have an unusual opportunity in this respect.

TEXTILE RESEARCH

The educational features of textile research are well worth consideration at this time. In the first place I know of no term that has been more loosely applied in recent years. The idea of research has a definite appeal to students in technical schools and colleges and to most men with a scientific and technical training. As a result many strange projects have been designated as research work. The definition of research given by Mr. Feiker I think will answer our purpose as well as any.

"By research is meant the process of thought that subdivides and analyzes the total problem into its parts, seeks to find definite facts for the solution of these parts and relates the findings to the solution of the total problem".

One of the three objects of the American Association of Textile Chemists and Colorists as set forth in the Constitution is

"To encourage in any practical way research work on chemical processes and materials of importance to the textile industry".

Our Research Committee holds its 109th meeting a week from today and from the beginning of our association 16 years ago, we have considered the work of this committee one of our most important activities.

There is not time to go into detail in regard to our work,

but in passing I will say that our permanent research committee includes about 40 of our leading textile chemists and colorists and under their direction there are twenty-eight sub-committees which are actively functioning. We have at the present time, five full time research associates working on different projects. Up to the present time 74 reports and papers have been presented by the Research Committee for publication in the Association's Proceedings. We spent approximately $20,000 on our research program last year. Toward this amount the Textile Foundation was the largest contributor, and the Chemical Foundation and our Corporate members furnished the remainder.

Work of this kind will not only prove of great value to industry as time goes on, but at the present time is furnishing a valuable "back-log" to textile education.

ATTITUDE OF EMPLOYERS TOWARD TEXTILE EDUCATION

One of the most gratifying developments which I have had an opportunity to observe over a considerable period of time has been the gradual change in the attitude on the part of manufacturers, and the older type of self educated dyers and colorists, toward technical education. Many manufacturers were at first decidedly skeptical as to its value. They believed that a young man who had had the advantage of four years of practical training in their mills would be far more useful to them than those who had spent four years in a textile school. We grant that as far as the textile school graduate was concerned this would undoubtedly be true the first week, the first month and perhaps even the first year, but it is only a question of time until a reversal of this order takes place. In the majority of such cases, after several years, the former is taking orders from the latter, and within ten years from the time that both graduate from high school, the one with the technical education will in most cases have outstripped the other in ability, grade of position and salary.

It is now rapidly reaching the point where many of our mill managers, superintendents and overseers have had some textile school training either in regular day courses, or in the evening schools, and they naturally favor the technically trained man when selecting their assistants.

The textile manufacturer, the dyestuff and chemical manufacturer, and the distributor of their products all profit to a very great extent, by the higher type of textile education. The textile manufacturer because he has a more intelligent, and capable type of men running his plant, because exactness to a great extent has replaced the disastrous rule of thumb, and because he has more intelligent and for the most part highly trained men, calling to sell him dyes and chemicals, rather than the men of old whose chief qualifications were the telling of stories. The dyestuff and chemical distributors prefer them because they believe that technically trained men present the merit of their products more intelligently and successfully than the salesman who relies on friendship and entertaining.

MILL LABORATORIES

It is becoming more and more necessary for the textile plant to maintain a well equipped laboratory with men capable of making both physical and chemical tests. This has come about partly through consumer consciousness as to what quality of materials to expect, thus leading to rather rigid demands upon large mail order houses, and department stores and they in turn demand from the mills deliveries of definite specifications. Furthermore, very definite specifications are being set up through certain U. S. Governmental agencies such as the National Bureau of Standards and the Federal Trade Commission, which in many instances must be complied with, especially if dealing with the government.

The subject of Textile Education is of such a broad scope that I feel that I have rather inadequately covered the subject as a whole. I trust however I may have given you a few fundamental facts which may contribute something to your interest in textile education.

—♦♦—

The Metallic Perchlorates

Their Textile Chemical Possibilities

A. H. PETTINGER

UP to the present, very little information regarding the metallic perchlorates has appeared in the textile literature, and while it is as yet too early to state how far the claims made for these compounds can be substantiated, there is at any rate enough data to indicate that an interesting new class of chemical auxiliaries has been brought to light. A brief outline of the applications of the metallic perchlorates will serve to show that here is a promising new line for research and that further developments will be worthy of consideration.

Some of the earlier patented processes in which perchlorates are mentioned make use of them in a catalytic sense in the esterification of cellulose. Thus, A. C. Thaysen of the Chemical Research Laboratory proposes to use perchloric acid or perchlorates as catalysts in the acetylation of cellulose fibers in order to prevent attack by destructive organisms (E. P. 411,930). This patent is an addition to E. P. 399,952. The perchlorate may be used in dilute solution, between 1/40 and 1/200 normal, in con-

(Continued on page 136)

PROCEEDINGS OF THE

American Association of Textile Chemists and Colorists

MARCH 7, 1938

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CALENDAR OF COMING EVENTS

Meeting, New York Section, Chemists Club, New York, N. Y., March 25, 1938.

Meeting, South Central Section, Andrew Johnson Hotel, Knoxville, Tenn., April 9, 1938.

Meeting, Philadelphia Section, Penn A. C., Philadelphia, Pa., April 22, 1938.

Meeting, Southeastern Section, Hotel Dempsey, Macon, Ga., April 23, 1938.

Meeting, Council, National Bureau of Standards, Washington, D. C., 9:30 A.M., April 29, 1938. Research Committee will meet in the afternoon of the same day.

Spring Meeting, Piedmont Section, Greensboro, N. C., May 7, 1938.

Annual Meeting and Convention, Atlanta, Ga., December 2 and 3, 1938.

Metallized Azo Dyes*

M. L. CROSSLEY†

THE introduction of certain metals into the molecular structure of azo dyes that contain metallizable groups causes profound changes in the capacity of these dyes to transmit colored light and also increases their resistance to changes associated with the absorption of radiant energy under ordinary conditions of exposure. The changes in hue and fastness to light obtainable by metallizing often make it possible to convert fugitive azo dyes into satisfactory commercial products. The color and other properties of the dyes depend upon the nature of the metal and the molecular structure treated. The metals which give important effects are chromium, copper, iron, manganese, cobalt, nickel, vanadium and zirconium. Certain other metals, such as tin, aluminum and titanium give less desirable results.

The exact nature of the way the metal is associated with the other components of the dye molecule is not yet known. However, it seems probable that the dynamic molecular conditions localized in certain groups in the molecule and concerned with the phenomenon of radiant energy absorption is particularly changed by the presence of the metal.

These groups responsible for the origin of the color given by the dye may be considered as intramolecular systems which are capable of responding to increments of radiant energy of definite characteristics. They respond in a similar manner to the way that tuning forks respond to definite sound vibrations. The metal serves as a modifier of the "color tuning forks." The absorbed radiant energy must cause some shift in the energy relation within the molecule and particularly in the groups associated with color. This shift probably results in a change in the energy level of the system and influences the reactivity of the product. The molecule is activated and an "open reactive field" produced in a definite portion of the molecular system. It is not necessarily the amount of energy in the system that is significant insofar as molecular stability is concerned but rather the way in which the energy is distributed. This is what determines the reactivity and governs the degree to which the color will change under particular conditions.

The groups that endow the dye molecule with metallizable properties are limited in number and they must occupy a definite position in the molecule. The essential structure requires hydroxyl groups, or hydroxyl and carboxyl, or hydroxyl and amino groups, or hydroxyl and carbonyl groups on each of two aryl nuclei, in ortho position to the azo bridge. These pairs of "metallizable groups" are associated in some way with the azo group in bonding the metal in the molecule in unionizable form. There is no certainty at present that these groups are of the same nature, having the same chemical characteristics, in the dyes as in the intermediates. Because an o-aminophenol is transformed into a diazonium compound and this coupled to a hydroxyaryl component is not sufficient evidence of the existence of the hydroxyl groups in the resulting dyes. I have good reason to doubt the presence of the "OH" group with its usual properties in such dyes. Likewise, the existence of carbonyl or amino in the coupling component before the coupling does not assure their being present in the dyes resulting from the coupling with o-hydroxyazo compounds. It is significant, I think, that the reactivity of the hydroxyl is changed. Generally the hydrogen is not as readily replaceable as in the corresponding intermediates.

That changes occur in the intramolecular structure of the nuclei as a result of the coupling is evidenced by the fact that the relation of the azo group to the carbon of the rings with which it is associated is different in the dye from what it was in the diazonium compound. In the latter, cleavage occurs, on decomposition, between nitrogen and carbon of the ring, while in the former, it takes place between nitrogen and nitrogen of the azo group. This must mean that in the coupling there has been a rearrangement of the energy of the system and this redistribution of energy has resulted in altering the relative stability and reactivity of the essential groups. The metallizable condition of the molecule must be associated with the nature of the forces bonding the azo group and the pair of groups essential to metallization with the nuclei.

Besides the above metallizable groups there is the well known o-hydroxy-carboxylic pair of groups which confer chromable properties on azo dyes. In this case the hydroxyl group is usually para to the azo group and the carboxyl group is consequently meta to azo and ortho to hydroxyl. Dyes containing this pair of chromable groups also produce soluble chromium dyes which in some respects behave like the metallized dyes. However, it is not known that they are similar in constitution.

The metal is firmly bound in the molecule. It is not

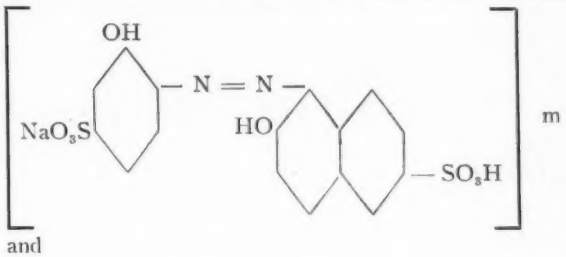
*Presented at Annual Meeting, Philadelphia, Pa., Dec. 4, 1938.
†Calco Chemical Co.

present in organic salt form, for, it is not effected, as a rule, by acid or alkali. This suggests that it exists in some stable metallic organic combination. The exact constitution of the metallized dyes must await further information from the researches now in progress. These metallic compounds are freely soluble in water and crystallize in certain cases from this solvent. The corresponding organic salts are insoluble in water. Under certain conditions the water solutions of the metallized dyes react with alkyl and aryl amines, giving water insoluble compounds retaining the metal. These complex compounds are soluble in alcohols and other similar organic solvents. They produce interesting spirit soluble colors.

The colors obtained with both the water soluble and spirit soluble metallized products vary within wide limits, depending upon the nature of the dye molecule and the metal or metals used. In general it can be stated that copper is more hypsochromic than chromium and iron more bathochromic than either copper or chromium. Cobalt and nickel are similar to copper in color effect, but, the nickel dyes give colors that are less fast to light than either cobalt or copper. The light fastness of the colors from the dyes containing chromium is generally excellent. These colors are usually different from those obtained by treating dyeings with agents furnishing the metal. Manganese is less bathochromic than iron but more so than the other metals mentioned. Vanadium and zirconium are similar in their effects on color to chromium.

The method of introducing metal in the dye molecule generally consists in treating the water solution of the dye with an agent capable of furnishing the metal desired and regulating the hydrogen ion concentration of the solution to meet the requirements of the case usually with an organic acid or salt of the same, the temperature of the reaction mixture varying widely depending upon the nature of the products treated. The reaction is continued until tests show the metallization to be complete. For this purpose a satisfactory test is the measurement of the absorption curves of a series of test samples taken at different times. When there is no further change in the spectral curves, metallization is complete. The reaction may be conducted under reflux or under pressure, depending upon the circumstances governing each case.

A large number of metallized dyes have been made but they represent a relatively few important structures. Some of the typical structures are o-hydroxyazo-aryl compounds containing different substituents on the rings and in which one or more of the substituents give water solubility. Among these are represented both mono and poly-azo dyes which dye animal or vegetable fibers, depending upon their structure. The former are usually nitro-aminophenol derivatives and the latter aminonaphthol sulfonic acid derivatives, particularly derivatives of 2-amino-5-naphthol-7-sulfonic acid. Types of these two classes are:



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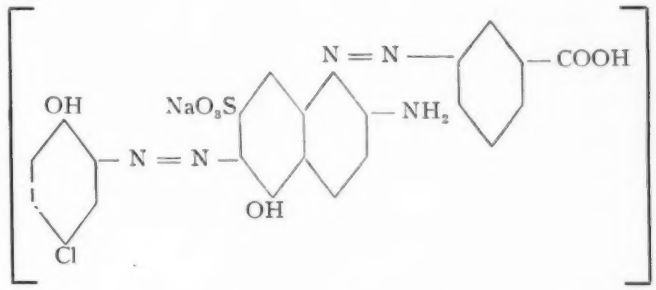
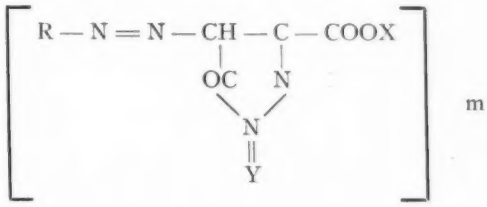
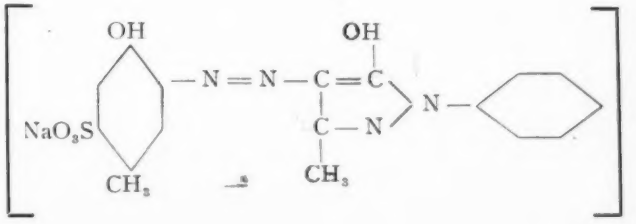


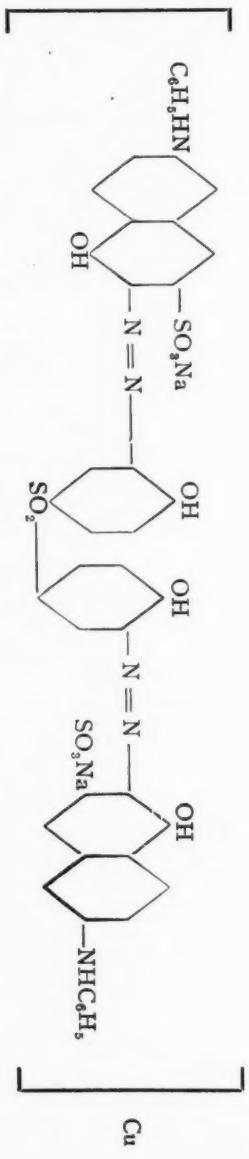
Several types of nuclei have been found to be suitable for metallization when they contain the proper substituents. These widen the scope of the application of metallized products. The o-hydroxy-azo pyrazolones metallize to give interesting wool dyes. These may be represented by the structural formula:



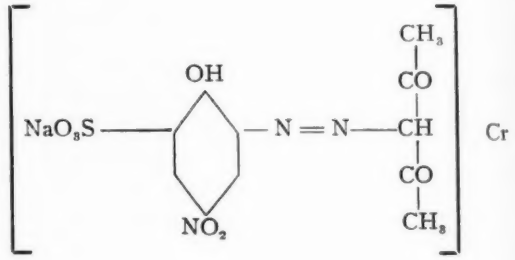
in which R stands for an aromatic nucleus containing an OH group in an ortho position to the azo bridge. The copper and chromium derivatives are particularly interesting. The X in the formula represents hydrogen or alkyl, Y represents hydrogen or aryl, and m stands for one or more atoms of metal. Similar metallized dyes are obtained by treating o-hydroxy-arylazo-phenyl-methyl pyrazolones with agents that will furnish metal to the dye molecules. This type is represented by the structural formula:



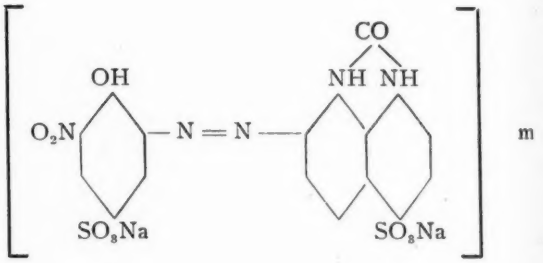
Much complexity of structure may be introduced into the metallizable dyes and one or more pairs of metallizable groups may be present. One may choose the molecular architecture to give the dye properties desired. For example, by selecting as a middle component 3-3′ tetrazo 4-4′-dihydroxyphenyl sulfone and coupling with two molecular equivalents of phenyl-J acid a dye is obtained which forms copper complexes, dyeing cotton reddish tones of violet. The molecular structure is:



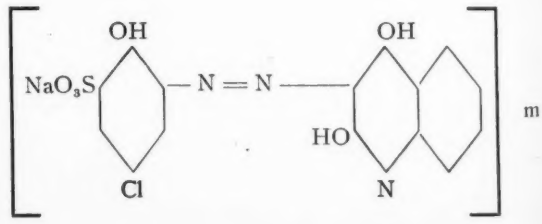
Chromium complexes which give yellow colors of excellent fastness to light may be obtained by coupling o-hydroxy diazo compounds with B-diketones and then treating the dye with chromium compounds under proper conditions for metallization. Typical of these is:



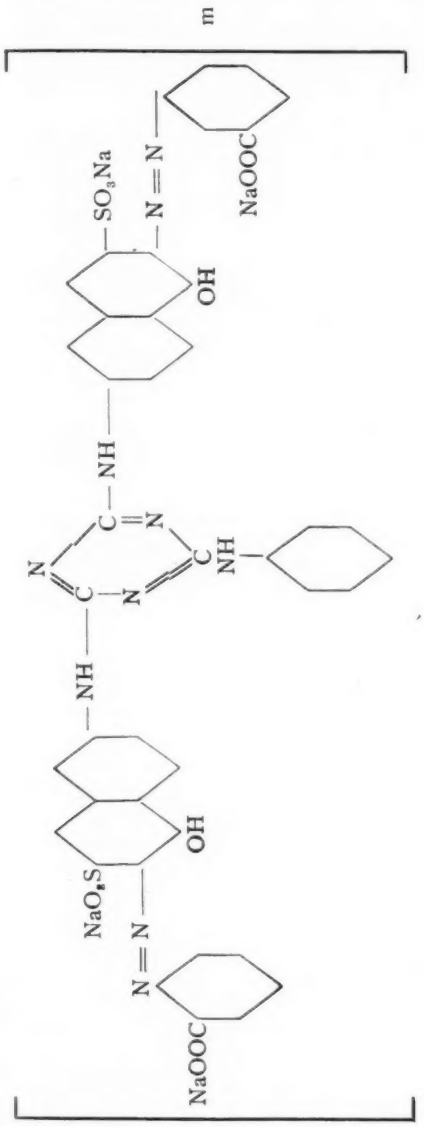
Metallized ortho-hydroxyazo pyrimidines which dye wool level fast colors are obtained by coupling o-hydroxy-azo compounds with naphthalenediamine-4-sulfonic acid, then phosgenating or condensing with a dihalogen alkyl compound and subsequently metallizing with chromium or copper. Typical of this class is:



Heterocyclic rings have not escaped attention. Chromium products dyeing wool orange to red hues are formed by metallizing the dyes from o-hydroxy-diazo compounds and 2-4 dihydroxyquinoline. These dyes are characterized by producing colors of excellent fastness to light, washing and milling. A typical example is:



Also in this class are the metallized dyes obtained by coupling ortho-hydroxy or carboxy-azo compounds with cyanuric acid complexes. Both symmetrical and unsymmetrical types have been produced. The following illustrate these important types:



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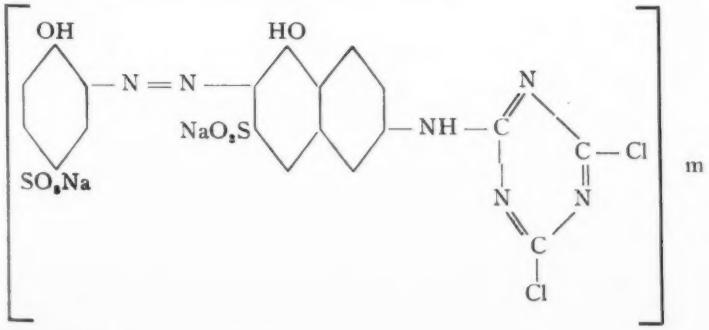
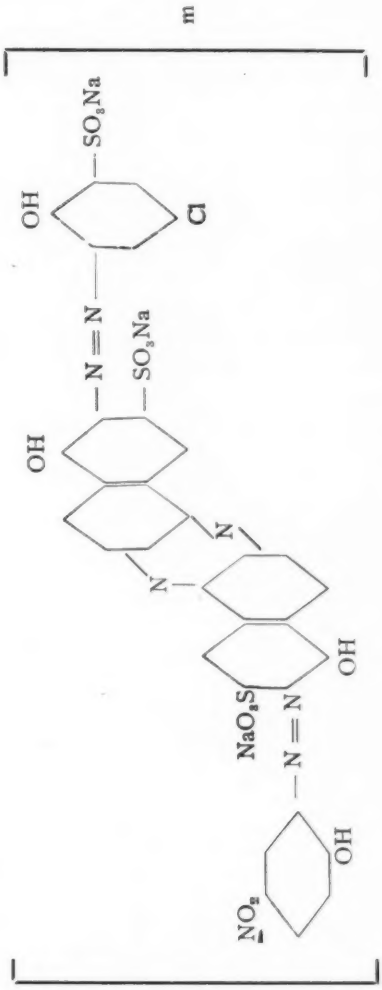


These products dye both animal and vegetable fibers colors of good fastness to light.

Also in the class of heterocyclic compounds are the metallized dyes from the dinaphthazine of J acid with ortho-hydroxy-diazo compounds. An example of this class is:



The firmness with which the metal is held in these complex metallized dyes is shown by the fact that they may be treated with various chemical agents and converted into derivatives without eliminating or essentially disturbing the metal in the molecule. It would seem, indeed, that the metal stabilized the dye molecule. For example, metallized dyes containing nitro groups may be reduced to the corresponding azoxy or amino compounds and these converted into other compounds without destroying the metal-dye complex. The amino compounds so formed may be acetylated, benzoylated and phosgenated and the resulting products still retain the metal. This is extremely important and makes possible a great variety of interesting reactions. The stability of these complexes in chemical reactions is consistent with the finding that the metal renders the dye faster to light. It evidently diminishes reactivity. The metal serves to facilitate the energy distribution so as to produce a condition of symmetry or a "closed reactive" field in the molecular system. This stability of the dye systems containing metal is best known by the resistance of the metallic complexes to sulfurizing agents. For example, the chromium compounds of o-hydroxyazo dyes may be treated with sulfurizing agents and thus converted into sulfur dyes which still retain chro-

EFFECT OF METAL ON COLOR

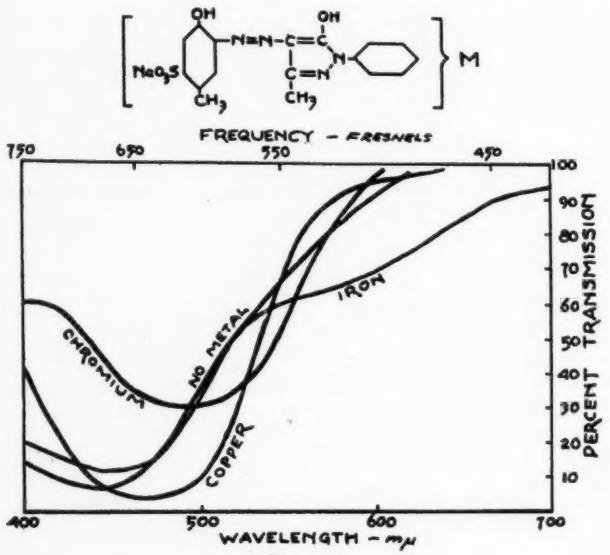


Chart I

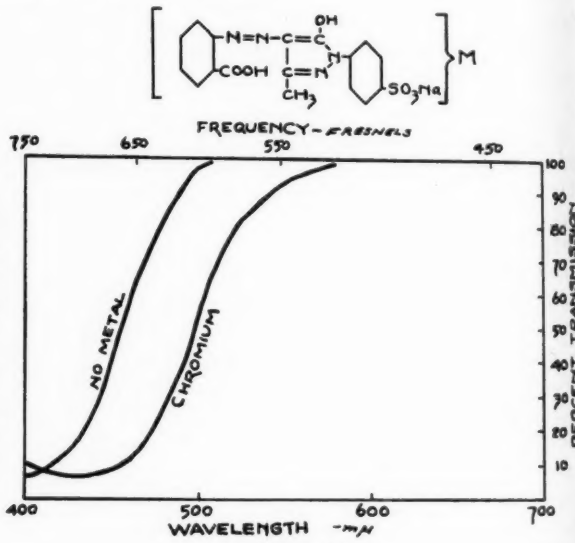


Chart III

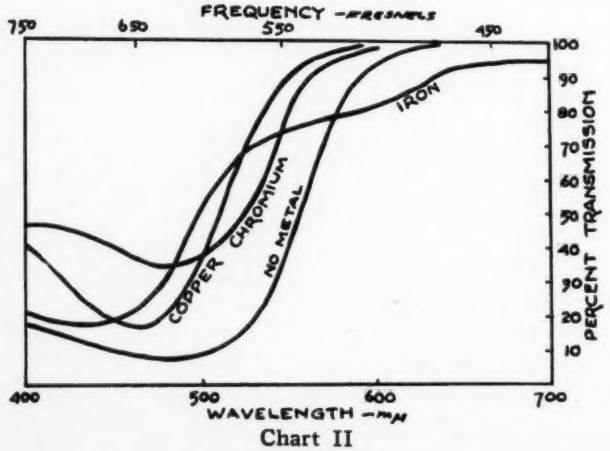


Chart II

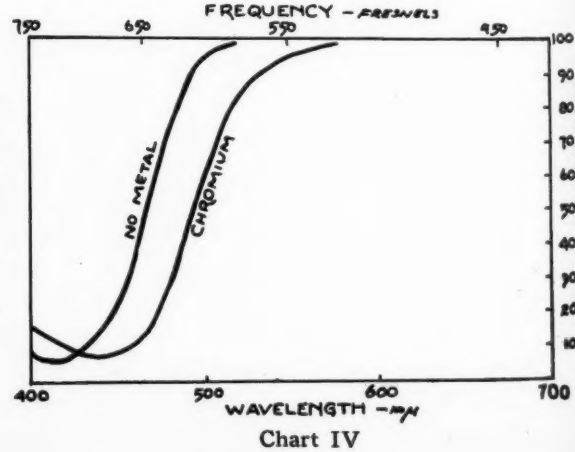


Chart IV

mium. Of course the constitution of these sulfur dyes is unknown and there is no assurance that the metal is retained in its original relationship with the azo and metallizable groups. However, the same azo dyes without chromium when treated with sulfurizing agents are destroyed. It is therefore safe to say that the chromium in its peculiar bonding in the molecule has stabilized the molecule of the dye or some particular portion of the molecule. It would seem likely that the metal protects the azo group from the reducing action of the sulfurizing agent. In other words, the field of reactivity involving the azo group is closed by the presence of the metal and its influence on symmetrical distribution of the energy of the system.

The effect of the different metals on the color of metallized azo dyes is shown in the following examples:

o-hydroxyazo-4-methyl-5-sulfonic-phenyl-methyl pyrazolone shows maximum absorption at about 660 Fresnels frequency or in the indigo and blue. The introduction of copper or chromium shifts the absorption toward the green. The copper complex absorbs more in blue than chromium and the latter absorbs more in the yellow and orange than either original dye or the copper derivative. Iron introduced into the molecule changes the absorption characteristics of the dye in a striking manner. It absorbs less in the indigo and blue than the unmetallized dye but more than the copper and chromium complexes. Iron absorbs over the entire visual range, transmitting only about 65 per cent of the orange and about 80 per cent in the red. These characteristics are shown in Chart I. The influence of substituents on the ring is shown in Chart II. Substituting a nitro group for methyl in position 4 on the o-hydroxyphenyl-azo nucleus and placing the sulfonic group on the phenyl nucleus of the pyrazolone causes a shift in the absorption of the unmetallized dye toward the yellow. The maximum absorption is in the blue-green. The introduction of metal tends to shift the absorption toward the blue. The substitution of a carboxyl group for hydroxyl in an ortho position to the azo bridge in the o-carboxy-azo-phenyl-methyl pyrazolone sulfonic acid shifts the entire absorption far over towards the indigo and permits everything below about 600 Fresnels frequency to be transmitted. The introduction of chromium shifts the absorption toward the yellow and gives maximum absorption in the indigo-blue. The transmission in the green is about 65 per cent while it is complete in the unmetallized dye. These results are shown in Chart III. In Chart IV it is shown that the introduction of chlorine atoms on the phenyl nucleus of the pyrazolone group does not have a significant effect on color. This is consistent with the evidence from previous investigations. Chlorine seems to influence fastness to light to a greater degree than it causes change in hue.

The nitro-o-hydroxyazo naphthols, having a pair of metallizable groups, in unmetallized form, dye wool different tones of red. On introducing chromium the products transmit much more blue, appearing reddish blue. The copper, cobalt and nickel compounds give bluish tones of red, the vanadium, titanium and zirconium dyes give yellowish tones of red and the manganese and iron compounds give rich tones of brown.

The influence of position isomerism is in all cases what would be expected from a knowledge of the properties of the corresponding isomeric unmetallized dyes. Where a group shifts the absorption the metal does not reverse this shift. The introduction of a second sulfonic acid group in the o-hydroxyazo beta naphthol-6-sulfonic acid molecule, in position 3 on the naphthalene nucleus, always tends to increase the transmission of blue and thus to give bluer tones of red while this second sulfonic group entering position eight on the naphthalene tends to give yellower tones of red. The metallized 6-8-disulfonic acid isomers are likewise yellower than the 3-6 isomers. The introduction of metals into azo dye molecules widens the scope of the researches on the origin and nature of color in organic substances and gives renewed hope that fundamental results will lead to a better understanding of molecular structure and energy relationships. It is only by having such knowledge that the chemist will be able to design dye molecules to specification.

LAPEL BUTTONS

A new supply of lapel buttons in 10 Kt. gold, bearing the seal of the Association, is now ready.

Orders from members in good standing, accompanied by price of $1.50, may be addressed to the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. Please make checks payable to "Secretary, A.A.T.C.C."

Some Comments on Permanent Sizing*

B. H. LITTLE†

IT is of general interest to know that we are large producers of cellulose as a raw material for the manufacture of rayon fibers, cellulose acetate, and nitrocellulose. Naturally, it follows that any development dealing with cellulose compounds is of vital interest to us. It is also a very short step from the production of ethyl cellulose to a consideration of its application when properly formulated as a permanent size, from the viewpoint of resistance to washing.

Because this subject is rather broad, it is understood this discussion is limited to a consideration of the application of a permanent size to cotton fabrics, so as to prevent loss when subjected to the average laundering operation—washing. Obviously, we are not discussing the so-called anti-crease finishes of the urea formaldehyde condensation type.

There apparently is no generally accepted standard by which a permanent size may be evaluated on a basis of performance from the standpoint of resistance and loss when subjected to laundering operations. In view of this fact that no standard exists, considerable time and interest has been spent in a creation of such a measuring rod to judge the performance of a so-called permanent size when applied to cotton fabrics, to resist subsequent washing operations.

Experience has shown that there are a great many textile technologists that are not fully familiar with laundering processes. In addition there is no general conception of the marketable value of a permanent size. Obviously, when cotton fabrics are made, for example, into wearing apparel, such a garment becomes soiled. Of what interest is it to wear a garment that is permanently sized? What is the economic value? Such questions as these are of great interest to us because it is very necessary that we be sure of the economics of this subject of permanent size, inasmuch as it represents a truly pioneering development within the industry.

Obviously, when one thinks of applying an extraneous material to a fiber, we think of whether it will prolong the life of the fabric. When choosing a sizing material, it is necessary to know if the life of the fiber is going to be affected, negatively or positively. Assuming that the life of the fiber is affected positively, the next question which follows is: What about the practicability of handling the product during the plant operations when applying to the fiber? Will it be necessary to install a lot of machinery, spend a great deal of money, therefore, in such installation? What are the health hazards involved in handling such a new type of material on the part of the labor? If such a sizing material is to be used as an overcoating or in conjunction with other finishing agents, what affect will it have on the finish that is being overcoated or the materials being used with it simultaneously? Another question of vital importance is: Will the matching of shades be made more difficult? We might say briefly in answer to all of these questions, that such a permanent sizing material should be produced according to a specification that will fit it into the current finishing practices, utilizing present types of equipment, without making the dyeing and finishing process more complicated than it is at present.

In the pioneering and adaptation of ethyl cellulose in an emulsion form, we have had all of the foregoing questions in mind. Ethyl cellulose is very closely related to the cellulosic content of the cotton fiber. Its application in the present emulsion form is very simple. Time, pressure, and temperature are the necessary fundamentals of the control of its application. Time of immersion of the fabric, pressure when passing through squeeze rolls, temperature of the drying operation, are factors that are currently available in every mill doing wet processing. In view of the fact that this material in its present emulsion form is inert from a practical chemical viewpoint, no problems of any major importance are caused from the standpoint of matching color shades.

Granted that the economics of the use of a permanent size from the viewpoint of this discussion is solved, it will be of interest to describe briefly the high-lights of the development of ethyl cellulose in emulsion form as it exists at present.

Our first consideration was to so modify the fusion point of ethyl cellulose that current temperatures utilized in finishing plants could be used in setting the size on the fiber. Extensive work has been done to perfect the emulsion size so that it is quite possible to set the size on the fiber, utilizing temperatures ranging from approximately 250° to 375° F. without difficulty. We may summarize this phase of the development by saying that the basic ethyl cellulose has been modified to an extent that it has neither an oxidizing or reducing action on

*Presented at meeting, Philadelphia Section, Oct. 8, 1937.

†Naval Stores Department, Hercules Powder Co., Wilmington, Del.

other types of finishing agents, and in addition is capable of being modified to give a soft hand or feel as compared to the boardy, crisp type of finish.

We all know that emulsions are very tricky. If you don't believe it, go into a drug store and look at the preparations in an emulsion form and notice how many are broken into layers. Usually these types of formulations have the "Shake Well" label on the bottle. We, likewise, in the early stages of our development had a great deal of difficulty in stabilizing ethyl cellulose emulsions to make such emulsions of practical value from a handling standpoint in the textile mills. However, by the use of highly perfected homogenizers, and the proper choice of stabilizers ethyl cellulose has been satisfactorily transformed into a sufficiently stable emulsion for practical application to textile fibers.

It is important to note that particle size of the dispersed ethyl cellulose is of great importance. Particularly in consideration of penetration of the size into the fiber. Here again extensive work was done to perfect this part of the emulsion so that the penetration of the size into the fiber represents no great problem. In addition, obtaining the proper particle size of the dispersed phases enabled us to solve the problem of stability during storage and shipping. We are not entirely satisfied with the progress along these lines. However, the problem of stability has been reduced to a point that we are not having a great deal of difficulty along the lines of storage, and stability during shipment.

The questions to be solved at the present time are those raised in attempting to meet the standards of the various individual finishes. This is a problem because at the present time there is no uniform conception of specifications for such a permanent size. Some of the most important merchandising channels are in disagreement as to what constitutes a permanent size. In addition, each type of cotton fabric constitutes a separate problem from the standpoint of finish. Undoubtedly, there will be a number of chemical compounds eventually used as permanent sizes, in view of the great variety of finishes desired, and of fabrics to be sized.

We have recently consummated a successful introduction of the principle of utilizing a powerful wetting and penetrating agent in the washing of fabrics as done by the commercial steam laundries. This valuable experience has given us a broad fundamental knowledge of what constitutes laundering operations in the removal of soil from fabrics. Based on our original survey of the finishing industry, and our knowledge of commercial laundry practices, we have been able to set up a rigid requirement for permanent size performance. We are using this measuring rod on the basis of 20 consecutive laundering operations. We might point out at this time that it would be well for the Research Committee of the Association to consider standards for permanent size, based on a grouping of closely related fabrics and the ultimate wear such fabrics will receive. It is rather unfortunate that the word "permanent" is apparently necessary to use in describing these new types of sizing materials. This is so because many individuals conceive such a described material as being permanent in the truest sense of the word. It is very much like the question of minimizing crocking. Most anything that will bind the color will tend to favorably affect crocking. The question is a relative one. Apparently permanent sizing also is rather relative in this sense. The important point is, though, that it looks very much as though relatively permanently sized fabrics will became entrenched in the textile industry. This is so because fabrics relatively permanently sized are now being produced and sold into channels because the use of the permanent size makes the sale of this fabric possible.

Mr. Chairman, these are some comments on our approach to the question of permanent sizing.

DISCUSSION

Q. How does the size affect any dyestuffs?

A. The ethyl cellulose itself is neutral.

Q. Does it make the shade fuller?

A. It tends to do that. Very definitely so. There are some indications that we are able to match a shade by reducing the amount of dyestuff slightly.

Q. Is the size affected by treatment in laundry?

A. When the fabric is sized and is wetted down, it becomes limp as it ordinarily would with a starch size. We have very good evidence that it is easier to clean. We do not require a high pH in the laundry wheels to get dirt out. When it goes through the mangle, the temperature and the pressure regenerate the setting of the material and it goes back to its body, handle and feel.

Q. Is there a definite temperature range to set the size?

A. Minimum temperature would be, as the product stands now, 250° F., preferably 250-375° F.

Q. Does ethyl cellulose hydrolyze readily?

A. No. It is quite inert.

Q. Does the use of ethyl cellulose as a finish impart water repellancy?

A. Not in itself.

Q. How does it affect shrinkage and Sanforizing?

A. There is a good deal of work we have to do in answering that question. Indications are it favorably affects shrinkage.

Q. Do the various viscosities of ethyl cellulose affect the setting point at all?

A. There is indication that the viscosity does have something to do with it.

Q. In preparing this permanent size, is it necessary to have a solvent present in the emulsion?

A. Ethyl cellulose is not soluble in water. The product could be spoken of as an emulsion of the lacquer phase of ethyl cellulose.

Q. You do feel that it is necessary to plasticize ethyl cellulose?

A. The fusing point is so high that it is almost to the scorching point of cotton, so that it has to be lowered.

Q. Do the ordinary plasticizers used with ethyl cellulose tend to sweat out on repeated heating?

A. Some of them will and some of them won't. When generally using any plasticizer or plasticizing one material with another, from the standpoint of permanency, they must be compatible.

Q. When adding different compounds to obtain the desired hand, and a certain finish, do you mean adding products such as sulfonated oil?

A. There are possibilities of emulsions in that field. Combination of ethyl cellulose and waxes offer possibilities in the direction of waterproofing. It is possible to incorporate many of the well known softeners and obtain a softer finish. The trend on printed fabrics is to have a full drape and a soft hand. It would be desirable if that finish would be more or less permanent. We have not investigated those angles to a point where we can comment definitely, except as to those possibilities that are indicated.

Q. You spoke about the effect on dyestuffs—do you mean material could be bleached, dried, and a permanent finish applied and then dyed on top of it?

A. It is preferable to dye before. For certain fabrics, it would be almost necessary to dye before. However, we have dyed ethyl cellulose and applied the dyed emulsion to cloth, and almost the same effect is obtained as when piece dyed.

Q. Do dyestuffs have the same affinity?

A. They have a greater affinity, generally.

Q. Is it necessary to apply the temperature after laundering to bring the finish back again?

A. Yes, and the fabric has to be ironed damp. If it is laundered and dried and then subjected to pressure, it would not work.

Q. Could it be used on fabrics such as seersucker, and crepes, which are never ironed?

A. Every time these fabrics are washed, they would have to be ironed under hot iron to regenerate the finish. Indications are these emulsions can be adopted to these types of fabrics.

Q. Then the material is not suitable as a permanent sizing for any fabric which cannot be ironed at a reasonably high temperature?

A. No, not in the present form.

Q. If the hand is not regenerated, is the material still in the fabric?

A. We have given the cloth many launderings and passed through a suitable solvent. By this analysis, we still find ethyl cellulose present in the cloth.

Stainless Steel*

George W. Hinkle†

THE speaking part of this program will be confined to a discussion following the showing of the picture. The picture requires 45 minutes, and shows the actual manufacture, application and fabrication of stainless steel.

I know most of you men are familiar with stainless in the textile industry, and there probably will be a lot of questions following the picture, and we would like to entertain any discussion following the showing of the film.

. . . The motion picture "Enduro—The Perfected Stainless Steel" was shown. . . .

DISCUSSION

Chairman Baxter: There is a great possibility that a lot of those here have seen this picture, or one very similar to it, in Providence. I saw it there myself, and enjoyed seeng it so much that it was one of the reasons we wanted to have it here tonight, so the rest of you could enjoy seeing it.

Are there any questions you want to ask Mr. Hinkle?

Mr. Hinkle: I imagine most of you men are familiar with Stainless Steel in the dyeing and bleaching end of your industry. In the last several years there have been considerable quantities of Stainless Steel used in dyeing and bleaching, and it has proven itself very satisfactory.

Republic Steel makes about 25 different analyses of Stainless Steel. They are majorily alloys of iron and chromium, iron-chromium-and nickel, they all have different physical and corrosion resisting properties, and we have found that it is very beneficial that the proper analysis be recommended for the particular job.

In the textile industry we found that 18-8S has been very satisfactory for cotton dyeing where you are using developed colors or vat sulfurs and direct colors, and for peroxide bleaching. However, for acid and acid chrome colors, and for ageing equipment, 18 per cent chromium, 8 per cent nickel and 3 per cent molybdenum has been the most satisfactory.

For hypochloride bleaching, 18-8S MO has proven satisfactory where the operation is not continuous. It has advantages over other metals, as you are properly all aware. It doesn't tarnish or discolor the atmosphere of the dyeing house, and stays cleans and presents a clean surface to any subsequent treatment.

I did hope there would be some questions on the fabricating, or particular recommendation of analysis for a particular job. However at the present time, we are doing a lot of experimental work on Stainless for bleaching. It has proven itself in the dyeing industry for dyeing ma-

*Presented at meeting, New York Section, Oct. 22, 1937.
†Republic Steel Corp.

chines, at present we have a small experimental bleaching kier being installed which is at several bleacheries for experimental purposes, and at the present time has proven very satisfactory. (Applause)

Chairman Baxter: Thank you very much, Mr. Hinkle.

WINTER MEETING, PIEDMONT SECTION

THE first meeting of the 1937-1938 season of the Piedmont Section was held at the Poinsett Hotel, Greenville, S. C., Saturday, Feb. 19, 1938.

The technical papers and discussions were held in the afternoon of the same date. Dr. Rupp, Chairman of the section called the meeting at 2:45 P.M. We had three good papers for the afternoon session. Dr. Sivert Glarum, formerly with the A.A.T.C.C. as research associate, and now with Rohm & Haas, gave a very interesting talk on "Printing Thickeners".

Mr. Ben Verity, Technical adviser for Carbic Color & Chemical Co., gave a talk on "Some Dyeing and Printing Problems and Their Solution".

Mr. E. M. Edgerton, Director of the Style Bureau and Color Research for the Pacific Mills, read a paper on "Color Demands from the Merchandising Point of View".

All three papers brought some very interesting data to this group and many questions were asked with regard to the various topics. In the latter paper considerable discussion was held with regard to the A.A.T.C.C. wash test No. 2 which Mr. Edgerton stated was being used by the majority of the buyers and large mail order houses; yet he says that some are attempting to make their own test formulas. His idea was that the A.A.T.C.C. should consider the present formulas as adopted by the A.A.T.C.C. and consider some modification. This brought comments both for and against. It was motioned and seconded that Mr. Edgerton's paper be forwarded to the Research Committee of the A.A.T.C.C. that they may consider making a further study of this test with the possibilities of a better test, that can be rigid and adhered to at all times. This was carried. Mr. A. R. Thompson Jr. explained however that this had been done, and that they would consider an amendment on this, but he was of the opinion that the A.A.T.C.C. had done about all they could do on this, that it would be impossible for the A.A.T.C.C. or anyone to have a standard test that everyone must conform to.

The banquet was held at 8 P.M. with about one hundred and fifty members present. The after dinner speaker was Dr. Claudius T. Murchison, President of the Cotton Textile Institute, who gave a very interesting talk on the present cotton Textile situation.

We are grateful to the committee in charge for arranging such a good program and having such a good group of speakers for this meeting.

Respectfully submitted,

J. W. IVEY, *Secretary*.

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COLOR FASTNESS IDENTIFICATION

SPEAKING before the National Retail Dry Goods Association on February 3rd, Dr. R. E. Rose, Past President of the American Association of Textile Chemists & Colorists and director of the technical laboratory of the dyestuffs division, E. I. duPont deNemours & Co., in referring to the labeling of dyed fabrics stated that if the properties of the dye were used as a label then the ultimate consumer can be made to read a language she can understand. Enlarging upon this, Dr. Rose said in part:

"This seems very simple, but as a matter of fact it has been one of the most difficult of all advances to accomplish. Let us look into the situation a little further. In the first place let me assure my audience that the dyer and those responsible for his work are anxious to use the very best material available. On the other hand it is very difficult to persuade the merchandising group that there are such tremendous differences in dyestuff fastness, and in consequence there has been a tendency, over and over again, because of the extreme pressure of competition, to ask the mill to produce something that looked like a competitive article but did not cost as much. The only way to satisfy this demand was to sacrifice quality without sacrificing the original appearance, if this could be done. Sometimes both quality and appearance were sacrificed. Such a state of affairs meant that there was no certainty that the added cost, because there is an added cost of using higher grade dyes, could be recovered by a slightly higher price for the article produced, and so we have materials produced which are not what they should be, because of a certain lack of understanding on the part of those who set the price. In addition we have had a certain amount of misuse of the word 'guarantee', and dyed products produced by the use of inferior dyes have been put out with some kind of a nominal guarantee on the label. The retailer has taken refuge in refusing to guarantee the color of anything unless the goods carry a definite statement by a house in whose integrity he has real faith. And women have become exceedingly irritated by the contradiction between the statement of the sales force 'We can not guarantee any color' and the statements they read in their journals that the American textile mill produces goods of excellent fastness, as well as by the failure of 'guaranteed' goods.

"The only solution is the use of an identification mark on those goods which have been produced by a mill understanding the requirements needed to deserve the label, and some kind of service equivalent to a laboratory in each retail store, to test the quality of the goods and prevent the edging in of those who are not as conscientious as they should be. The Better Fabrics Testing Bureau in taking the responsibility for making such tests deserves your very enthusiastic support. Remember that they are in effect relabeling the dyes used as far as their qualities are concerned and in that way making it possible for you to obtain satisfaction from your relation to your customers in that very field which has been apt to give you most trouble . . . 'Color Tested' goods you can pass on to your customer as having satisfied the accurate, delicate tests which mean that everyone concerned will know exactly what will happen under the conditions of actual usage. Before many years we shall be wondering why we did not do something of this sort long ago because only in this way can we avoid the cry of the ultimate consumer 'I pay a little more for something that is guaranteed and it does not hold up any better than the cheaper material,' which means, of course, that the very life is taken out of the effort to introduce better class goods. Surely in this country every reasonable being is willing within his or particularly her means, to give a little more for something that is really good, but the buyer is very easily discouraged when she finds that her hopes are far from being realized. To sum up, there is no reason why the ultimate consumer should be disappointed because of the failure of dyed goods if they are handled reasonable. It may be necessary to emphasize certain shades and repress others in order to be sure of adequate fastness and in this connection it seems to me that the designers should work very closely with those who know what can and what cannot be done in using dyes. . . ."

The term "Color Tested" which Dr. Rose uses above was explained in a news story on page 86 of our February 7th issue. The seal of color fastness is to be known as the "Color Tested" seal and may be affixed to fabrics which pass standard color tests of the official laboratory of the National Retail Dry Goods Association, the Better Fabrics Testing Bureau. The plan is based upon fastness tests in keeping with the use to which the consumer will put the finished article. The "Color Tested" movement is an effort to provide the industry with a universally recognized symbol of satisfactory color fastness for consumer service.

As far as selection of dyestuffs is concerned there is no question but what the dyestuff manufacturer's products today are superior to any that have been available and they are constantly being improved. There is a need however for a guarantee that will mean to the ultimate user that the most suitable dye has been used.

The Metallic Perchlorates

(Continued from page 122)

nection with an acetylation mixture consisting of about 20 parts acetic anhydride and 80 parts of a diluent such as benzol. Some 15 parts of the above mixture is applied to 1 part of dry cellulose material, and the acetylation is arrested when the material has gained in weight between 18 and 25 per cent.

A method of preparing cellulose ethers, ether-esters, in which ethylene oxide is made to react with cellulosic material in the presence of certain salts, is the subject of E. P. 408,730 to the Soc. des Usines Chimiques Rhone-Poulenc, of Paris. Suitable salts include the chlorines of sodium, potassium and zinc, magnesium perchlorate, barium sulfocyanide, potassium acetate, potassium carbonate and benzyl pyridinium chloride.

For example, low viscosity cotton cellulose is treated with a 5 per cent solution of magnesium perchlorate in anhydrous acetic acid and subjected to ethylene oxide in vapor or liquid state. The product is then acetylated directly by adding acetic anhydride.

As distinct from processes in which perchlorates play only a subsidiary part as swelling agent or catalyst, the following invention relates specifically to perchlorates of beryllium, aluminium, magnesium, zinc and calcium as being principal agents in the preparation of artificial filaments, coated fabrics and plastic materials. E. P. 424,730 to Compagnie de Produits Chimiques et Electro-Metallurgiques Alais, Froges, et Camargue, 23 Rue de Balzac, Paris, covers several processes which depend upon the fact that cellulose and cellulose esters are soluble in concentrated aqueous solutions of metallic perchlorates, being afterwards capable of regeneration to form films and filaments.

Thus, 100 kgm. of dried cellulose, for example paper or wood pulp, is mixed with 2100 liters of a saturated aqueous solution of beryllium perchlorate. The chemical composition of the salt is given as $5Be(ClO_4)_2.2BeO$, and 100 c.c. of the solvent solution contains 4.96 grm. of beryllium and 77.9 grm. of perchloric acid. It is stated that cellulose dissolves in this solution very rapidly and gives a solution from which cellulose may be regenerated by precipitation with water.

In another example, 5 kgm. cellulose formate is treated with 50 liters of saturated magnesium perchlorate, $Mg(ClO_4)_2$ and homogenized and filtered. The cellulose solution thus obtained may be employed in the manufacture of artificial threads in the usual manner.

There is undoubtedly scope for further investigation of the perchlorates as to the practical application of cellulose solutions in finishing and similar fields. The practical aspect of rayon manufacture by the perchlorate method is yet to be explored; it may prove an unwieldy and uneconomic system in comparison with the viscose and cuprammonium processes, but investigation may disclose other unlooked-for possibilities.

The chlorates of potassium and barium are used in pyrotechny for providing the oxygen necessary for combustion. These salts are relatively unstable, especially in the presence of oxidizable material like sulfur. The solubility of these compounds is comparatively low.

On the other hand, the metallic perchlorates are more stable than the chlorates, in fact it is said that lithium perchlorate is stable up to 400 deg. C. Although the perchlorates contain a high proportion of oxygen, they are little used in pyrotechnic compositions and mixtures for burning. In fact, it has been stated that aqueous solution of the perchlorates are effective for extinguishing fires, especially oil fires.

A distinctive feature of the metallic perchlorates is their easy solubility in, and great affinity for water. Magnesium perchlorate has such a powerful attractive power for moisture, that it may be used as a drying agent, when it surpasses the familiar phosphorus pentoxide. Some of the perchlorates of the metals are soluble in organic solvents, a somewhat unusual property. Thus silver perchlorate may be dissolved in benzene and lithium perchlorate in ethyl ether.

TECHNICAL NOTES FROM FOREIGN SOURCES

Dyestuff Condensation Upon Fibers

Dr. E. Schupp—Monats. f. Seide u. Kunstseide 219, 41 (1936).—This paper deals with the physical condensation, locally, of a dyestuff already dyed upon (really into) the fiber, in the sense of its partial migration within the limits of the fiber through heat and moisture, resulting in a change of tone and of fastness.

Haller and Ruperti studied the topic in 1925, and found that a dyeing, normally carried out, of para-nitraniline red upon Chardonnet silk displayed an orange tone, yet the dyeing appeared completely homogeneous under the microscope, both linearly and in cross-section. When such a fiber was boiled in water for a time, they noticed, first, a change in color from orange to blue-red; and the fiber, examined under the microscope, now showed no homogeneity of distribution of the pigment-particles; the latter were coarser, more granular, and were surrounded by a distinctly free area; the highly dispersed particles had migrated and aggregated to larger groups, these being deeper in color-tone, and leaving the surrounding spaces which the finer particles had occupied vacant. By further heating in the wet state, under pressure, the migratory process proceeded further; the interior of the fiber became progressively poorer in pigment-particles, while the aggregates of the latter near the surface of the fibers became still more large—there was evident a progressive migration of the particles to the surface of the fiber. This process was continued to such an extent that, finally, the pigment actually

collected *upon* the surface of the fiber, and could be removed by washing and rubbing. When a natural cotton fiber, so dyed, was treated in the above manner, this migration and aggregation took place toward the lumen as well as toward the outer surface of the fiber. Washing and rubbing would then remove the pigment upon the surface of the fiber, while the pigment in the lumen could not, of course, be so dislodged. Haller called this phenomenon physical dyestuff condensation, and stated that no chemical reaction was involved.

Haller and Ruperti found that the phenomenon appeared in the case of many other dyeings. They examined Para Red and Naphthylamine Bordeaux among the developed dyestuffs. Among substantive dyeings, those with Dianil Blue 3R, Congo Red, and Congo Corinth 1R behaved similarly; and, among mordant dyestuffs, Alizarine also behaved in the same way. Among the vats, Indigo and Thio-indigo, and Indanthrene Red 5GK gave the same result. But Indanthrene Brilliant Violet RK gave no such results in any striking measure even after 15 hours heating in steam at 1 atmosphere. Indanthrene Blue RS also gave a negative result after 15 hours of steaming at pressures up to 6 atmospheres.

Haller and Okany-Schwartz afterward carried on studies in the subject in a more extensive way. They heated dyed fibers in other media beside water, media which were of indifferent nature toward the dyestuff studied. They found that Indigo dyeings, with alcohol, showed the phenomenon strikingly, the pigment aggregating to actual tabular crystals. Methyl alcohol and glycerol acted in the same way as ethyl alcohol, while carbon tetrachloride and chloroform destroyed the fiber completely, apparently through splitting off of HCl and chlorine. Pyridine gave the most striking results with the anthraquinonoid dyestuffs. Ruperti found that, of the mineral colors, chrome yellow did not display the phenomenon at all under any conditions employed.

Apparently the natural and general tendency of very finely divided particles of solids to aggregate under the influence of heat in a liquid medium is favored by the swelling of the fiber in the present case. The micelles, in the process of swelling, leave larger interspaces between each other. It ought, therefore, to be expected that the above phenomenon, of aggregation of particles of the pigment, ought not to take place so easily if the liquid medium contained substances which depress the rate and degree of swelling. Kayser has studied the point in reference to Naphthol AS dyeings—the particular pigment chosen was the Naphthol AS-SW—Fast Red KB Base combination—and investigated the results of four methods of aftertreating the dyeings:

(a) soaped at the boil,
(b) treated with boiling water only,
(c) treated with boiling solutions of alkalies,
(d) soaped at the boil with baths containing in addition increasing amounts of common salt.

With method (a), aggregation of pigment and alteration of colortone were observed, with method (b), this effect was much diminished, with method (c), it became very evident again. With method (d), the effect was less to be observed, the more salt was present; at the saturation point, or nearly so, and a temperature of 109° C, no aggregation or change in colortone was evident.

The phenomenon is accompanied by two results, change in colortone, and loss in fastness. As to the latter, it is plain that, with the pigment actually lying upon the surface of the fiber, the dyeing cannot be fast to rubbing; and, further, if the pigment-particles lie deeply within the fiber, the substance of the latter must protect the pigment more or less from the action of light, so that, with the aggregatized fiber, the pigment lying much nearer, or even upon, the surface, such a dyeing could not be so fast to light. This has proved to be the case.

The above throws some light upon what goes on in the process of printing upon fabrics. When the printing-paste is applied to the cloth, the dyestuff is entirely within the paste. As soon as the paste begins to penetrate the weave, the formation of a membrane takes place between the dyestuff and the fiber. This membrane opposes the capillary force of the fiber. The dyestuff is therefore held fast upon the points which the paste has touched; not yet, be it noted, absorbed within the fiber. In the process of fixing, say, commonly by 1-2 hours of steaming at ½ atmosphere, the two factors, heat and moisture, requisite for the bringing about of the migration of the dyestuff particles, come into play; the thickening agent is gradually broken down by the same two factors, becomes less viscous, the bounding membrane therefore less resistant, the fiber swells under the influence of the same two factors, and the dyestuff really enters the fiber.

Another interesting point brought to light by Haller and Okany-Schwartz is, that, in cases of compound dyeings, the two pigments may migrate at different rates, resulting sometimes in a complete separation of the two components. For example, they were thus able to separate a green dyeing from Indanthrene Blue Green G and Anthraflavone GC quite smoothly into its components.

Interesting work has been carried out also upon other fibers beside cotton and rayon. Haller and Okany-Schwartz dyed cotton with Cibanone Blue GEDF, and then acetylated to 25 per cent acetic acid content, and treated the material in glycerol for two hours at 200° C. At the end of the treatment, the dyestuff was found to be upon the outside of the fiber, in an amorphous form. Also, they found condensation to take place even during acetylation (in this case the fiber being completely acetylated). Immunized cotton (cotton esterified by means of toluene-p-sulfonchloride), dyed with Cibanone Blue RSNP, gave a negative result when treated with alcohol, water, or glycerine at 140° C.—at least, the fiber was wholly disintegrated, and condensation could not therefore be detected. Amnio-cotton, obtained from the foregoing material by treatment with ammonia, was dyed with Cibanone Blue RSNP, and treated as before; the phenomenon of condensation was very evident. As this amino-cellulose shows

a decided affinity toward acid dyestuffs, some of it was dyed with Orange II, and the dyeing treated in alcohol at 130° C, but no condensation was evident. The dyeing was plainly the result of chemical reaction between the dyestuff and the fiber. Haller has commented upon such cases, and has pointed out that such dyeings should not display the phenomenon of condensation, while dyeings with pigments, in which the particles of coloring matter are located as definite micro-particles in the fiber, should be capable of migration and condensation under suitable conditions.

Benzoyl yarn, dyed with vat dyestuffs, and treated as above, displays the phenomenon. Yarns esterified with such benzene derivatives as carry amino groups should behave as amino-cellulose (above), and do so. The case cited was that of such a fiber whose amino groups were diazotized and developed with beta-naphthol. The red fiber obtained did not show the phenomenon of condensation when treated as above; but, when dyed with a vat dyestuff (Cibanone Dark Blue BO), and subjected to the usual treatment, did display the alterations characteristic of condensation.

Haller has extended these studies to other fibers—wool and silk—and has found the same general principles to hold good. His extensive work has led him to the conclusion that the occurrence or absence of the migration and condensation of dyestuff in the fiber decides absolutely whether the dyeing is of purely absorptive, or of chemical, nature.

The whole paper is well worth careful reading.

Action of Halogens Upon Wool

Prof. Dr. Haller and Dr. F. W. Holl—Mell. Textil-Ber. 17, 493 (1936).—The authors take up again a topic upon which the senior author (Haller) has previously worked, and consider it more from a theoretical standpoint.

The authors summarize their results as follows: in the action of halogens upon wool, careful consideration must be given as to whether water is also present, or absolutely absent. If present, the water first reacts with the halogen, with formation of hypohalogenous acid and halogen acid. The first of these reacts with the amino groups of the wool molecule, through which, through a series of intermediate stages, according to the pH condensation, either a ketone group enters in place of the amino group, or a splitting up of the molecule, with formation of acids and nitriles, takes place.

If the halogen acts upon the wool in complete absence of water, it is essentially adsorbed by it, and a slight substitution also takes place. The authors emphasize that these results were obtained in diffused daylight, at room temperature and at about 720 mm. barometric pressure, and that some variation in results is to be expected if their work is repeated under different conditions.

As a result of the slighter reactivity of iodine, some results obtained with chlorine and bromine could not be duplicated with this halogen. The much lower reactivity of iodine, however, made it more suitable for tracing the stepwise progress of the action of halogens as a whole.

The State of Cellulose in Solution

Dr. Th. Lieser—Monats. f. Textil-Ind. 52, 109 (1937).—A report (by H. Christoph) of an address delivered before the Colloquium des Deutschen Forschungsinstitute fuer Textilindustrie in Dresden, in February 1937.

Cellulose consists of extremely small construction-elements, so to speak, the residues of glucose or cellulose molecules, which are united one to another into long chains, by primary valence bonds. In natural cellulose (rather, cellulose in the natural condition, for as yet there is no such thing as synthetic cellulose), many of such molecules, or chains whose component residues are united by primary valence-bonds, are united into small crystallites, or micelles. The structure of the fibrous cellulose or rather the substance of the cellulose fiber as it comes from the plant, is built up of these micelles, and according to this view the micelle, according to Naegeli, is a crystallite, of which the smallest components are macromolecules.

It is important to determine in what sort of subdivision cellulose exists when in the condition of solution—is it micellular or molecular in nature? The answer to this question is of decisive importance, for example, for the spinning process, since in this process we are dealing either with a reprecipitation of the cellulose as a compact bundle of macromolecules, or a regeneration of the micelles, that is, a recrystallization of the filar molecules.

The authorities differ in their view of this question. Herzog advocates the assumption that the micelles are present in an unaltered state in the solution, while Staudinger assumes, as a presupposition for his calculations of molecular weights in a strongly diluted cellulose solution, for example, in cuoxane, the existence of isolated macromolecules in a state of true solution. Meyer and Mark adopt a standpoint between these two extremes, and consider that, from a certain limit of molecular weight onward, for example, 3,000, micellular solutions are principally encountered.

Substitution of organic bases for caustic liquor, in the process of mercerization or xanthogenation, has led to interesting results. The tetra-alkyl ammonium bases, if of sufficiently high molecular weight, are able to dissolve cellulose. The corresponding arsonium, phosphonium, and selenonium bases do not possess this property; nor does caesium hydroxide, although this is of a fairly high molecular weight. It seems that, with these organic bases, there is a chemical reaction involved in the process of solution.

A short summary is appended. The author concludes that the state of subdivision of cellulose, in solution, is able to reach the condition of isolated chain-molecules characterized by primary valence-linkage; that it is dependent upon the nature of the solvent, the length of these chains, temperature, and concentration; and that such molecular solutions can exist in organic bases as solvents. Solutions of cellulose in the condition of viscose are principally micellular in nature; in cuoxane they are strictly micellar. Celluloses which have been subdivided by solution into the isolated filar-molecules can be recrystallized again to the micellular condition, the new micelles being entirely similar to the original ones.

TRADE NOTES • NEW PRODUCTS

• SOCMA MEETING

The regular monthly luncheon meeting of the Synthetic Organic Chemical Manufacturers Association of the U. S. was held at the Chemists' Club, New York City, Friday, February 18th, 1938.

• CIBA REVIEW

Ciba Review, Number 6, has recently been distributed. The theme of this number is "Silks of Lyons." Among the contents are articles described by the following titles: The Development of Lyons as the Center of the French Silk Industry; Fashion and the Silk of Lyons; The Organization and Importance of the Silk Industry of Lyons; Technical Details of Silk Weaving and Dyeing at Lyons; Great Silk Merchants and Manufacturers of Lyons; Notes on the History of French Currency. Also included in this number is a supplement entitled: "A New Method for Printing Cibanone Blue RS Double Paste on Cotton and Rayon" which is a report from the Printing Laboratories of the Society of Chemical Industry in Basle. Copies of the *Ciba Review* are available upon request to the Ciba Company, Inc., Greenwich & Morton Sts., New York City.

• A.A.T.T. MEETING

A meeting of the American Association of Textile Technologists was held on the evening of February 2nd at the Architectural League, New York City. Sixty members and guests were present at the dinner which commenced at 7 P.M. to be followed later in the evening by an address which was given by Mr. Oscar A. Geier, textile patent attorney of the law firm, Richards & Geier, New York City.

• CAMPBELL ELECTIONS

As foreshadowed by recent announcements Mr. J. Pfister, formerly with the Calco Chemical Co., and before that owner of Wetterwald & Pfister, was elected President, Treasurer and Director of John Campbell & Co., 75 Hudson Street, New York, N. Y. at the annual meeting on February 21st, 1938.

Mr. Leonard G. Tubbs, at the same time was elected Director and Secretary of the Company. Mr. Tubbs has had wide experience in the consumer end of the dyestuff business, having been Purchasing Agent for a number of years for the United States Finishing Co., and more recently, for the National Dyeing & Printing Co. He is, at the present time, a Vice-President and a member of the executive committee of the Purchasing Agents Association of New York.

Mr. George C. Lommel will continue as formerly as Divisional Sales Manager, and Mr. Gustave H. Lind will be in charge of the bookkeeping and credits.

Mr. Melvin Steen of the well known law firm of Root, Clark, Buckner & Ballantine, was also elected to the board of directors.

• APPOINTED TREASURER OF AMALGAMATED

Leonard S. Little has been appointed Treasurer of the Amalgamated Dyestuff & Chemical Works, Inc., with offices at 60 Hudson Street, corner Worth St., (Western Union Building), New York City. The manufacturing plant is located at Plum Point, Newark, N. J., where Mr. Little will also have charge of Research and Production.

Mr. Little is to be associated with Mr. J. Pfister, recently of The Calco Chemical Company, Inc., Bound Brook, N. J. and Providence, R. I., and previously owner of the Wetterwald & Pfister Co. Mr. Pfister took over the Presidency of the Amalgamated early in the year.

The Amalgamated Dyestuff & Chemical Works, Inc. operates one of the oldest dye plants in the United States. The company plans active extension of its present line of dyestuffs and chemicals, including a line of vat colors and napthols which will be of particular interest to the Textile trade. At the present time the company manufactures an extensive line of acid, basic, chrome, direct, developed and sulfur colors. This company has pioneered in the research of acetate rayon dyes and has always had one of the most extensive lines of these colors in the country.

Mr. Little has had a long and varied experience in the textile industry since his graduation from Brown University in 1907, where he specialized in Chemistry and Engineering. He served as Chief Chemist of the Apponaug Mills from 1907 to 1911 and as President of the Narragansett Chemical Company from 1911 to 1914. For the following six years he was Assistant Superintendent of the Pawtucket branch of the U. S. Finishing Company and from 1920 to 1923 held a similar position with the Pacific Mills Print Works in Lawrence, Mass. During the next four years he had full charge of the development of the new plant built by the Pacific Mills at Lyman, S. C., designing the finishing plant and representing the owners during the period of its erection; then having the responsibility of operating the entire unit, including the finishing plant, cotton mill and the extensive and model village connected therewith. During 1927 and 1928 he was General Manager of Joseph Bancroft & Sons Co., with headquarters at Wilmington, Delaware. From 1928 to 1933 he was Vice-President and General Manager of the Slatersville Finishing Company division of Kendall Mills. Since 1933 Mr. Little has been President and General Manager of the United States Finishing Co. and of all the subsidiary companies, including the Queen Dyeing Co. of Providence, R. I. and The Hartsville Print & Dye Works of Hartsville, S. C.

Mr. Little served as a member of the cotton textile Code Authority under the NIRA and for many years has been a member of the executive committee of the National Association of Finishers of Textile Fabrics.

• DIISOBUTYL KETONE

Carbide and Carbon Chemicals Corporation has announced the commercial availability of Diisobutyl Ketone. This solvent offers possibilities in the production of lacquers, stains and varnishes. It also makes avaliable a new raw material for chemical synthesis.

Diisobutyl Ketone is a colorless liquid with a boiling point of 168°C. It is stated that the fact that this ketone boils at a much higher temperature than most other commercial ketones makes it a very interesting solvent. Owing to its favorable dissolving power for nitrocellulose (its xylene dilution ratio is 1.5) and various commercial gums, resins and oils, it may advantageously be used in nitrocellulose and synthetic resin coatings where a stable, slow evaporating solvent is desirable. It is said that it is miscible with many organic liquids, but is practically insoluble in water and is an excellent solvent for milled crepe rubber. The properties of Diisobutyl Ketone should be of particular interest to the lacquer manufacturers.

Diisobutyl Ketone undergoes condensation reactions and is thus significant in organic chemical synthesis since it extends the range of products obtainable through familiar ketone reactions. Its chemical structure, $(CH_3)_2CHCH_2(CO)$-$CH_2CH(CH_3)_2$, includes nine carbon atoms—said to be about the highest number found in any commercially available ketone. It is possible, by reacting Dissobutyl Ketone with amines and other chemicals capable of reacting with its carbonyl group, to arrive at novel compounds which may form important inhibitors, rubber accelerators, dyes, pharmaceutical and insecticides.

• CHEMURGIC CONFERENCE

The Fourth Annual Chemurgic Conference will be held at Omaha, Nebraska, April 25, 26, and 27, it was announced recently by Wheeler McMillen, president

of National Farm Chemurgic Council. Members of Chemurgic Councils in 20 states and national representatives of Agriculture Industry and Science will participate. The Conference programs will follow Chemurgic objectives of finding new uses for farm products as industrial raw materials and increasing farm income.

Wheeler McMillen, editorial director of The Country Home and noted agricultural authority, has been elected President of National Farm Chemurgic Council to succeed the late Francis P. Garvan. Mr. McMillen is one of the founders of the Council.

Willard H. Dow, president of the Dow Chemical Company, of Midland, Michigan, has been elected to succeed the late Howard E. Coffin as the Council's vice-president representing industry.

Executive management of the Council will be under the direction of President McMillen. Carl B. Fritsche, managing director, has returned to his private engineering practice at Detroit, Michigan, but will take part in Council activities as time permits.

Offices of National Farm Chemurgic Council have been moved from Dearborn, Michigan, to New York City to facilitate coordination of Council operations. Following is the new address: National Farm Chemurgic Council, Inc., 654 Madison Avenue, New York, N. Y.

• HERCULES DECLARES DIVIDEND

The Board of Directors of Hercules Powder Company on February 23rd declared a dividend of 40 cents a share on the common stock of the company.

This is payable March 25 to stockholders of record at the close of business on March 14.

• HAAS-MILLER REPRESENTATIVE

The Haas-Miller Corporation announces the appointment of Walter G. Leon as Southern representative. He will open an office at Charlotte, North Carolina.

• CHEMICAL EXPORTS

United States exports of chemicals and related materials continued to advance last year with the recorded aggregate value reaching the highest point attained in seven years, according to C. C. Concannon, Chief of the Commerce Department's Chemical Division.

Preliminary estimates indicate that the value of such exports exceeded $181,000,000 in 1937, which was 17½ per cent above the $154,000,000 recorded during the preceding year, and compares with $136,677,000 in 1935, $124,275,000 in 1934 and $107352,000 in 1933, he stated.

Practically every major item in the list shared in the gain last year—particularly industrial chemicals and chemical specialties, medicinals, paints, soaps, and toilet preparations, according to preliminary figures.

Exports of industrial chemicals, not including sulfur, reached the high figure of $27,505,000 in 1937 against $22,046,000 in the preceding year. In this classification shipments of sodium compounds increased from 512 to 703 million pounds but exports of gases, compressed, liquefied and solidified, decreased from 38 to 24 million pounds due to smaller foreign demand for petroleum fuel gases. Forty-five pounds of helium gas valued at $668 were included in the 1937 total, according to preliminary figures.

Foreign demand for chemical specialties was especially active in 1937—shipments in the classification reaching $27,500,000 against $20,500,000 in 1936. In this group shipments of insecticides and disinfectants increased from 34 to 45 million pounds; plastic materials from 14 to 20 million pounds; and polishes from 6½ to more than 7 million pounds, analysis reveals.

Exports of medicinal products, not including crude drugs, also advanced sharply in 1937 to a total value of $20,000,000—a gain of $5,400,000 over the record for the preceding year, according to preliminary statistics. All classes included in the group shared in the gain—shipments of biologicals increasing in value fro $2,200,000 to $2,564,000; nonproprietar from $4,120,000 to $5,825,000 and propri tary, from $7,034,000 to $8,732,000. E ports of crude drugs however, decline from $1,871,000 to $1,506,000 due entire to the decline in ginseng root shipmen to China following the outbreak of hosti ities in that country.

Paint, pigment, and varnish expor reached the value of $21,500,000 during t year against $17,800,000 in 1936. In th group shipments of chemical pigments a vanced from 180 to 214 million pound and ready mixed paints varnishes, an lacquers from 4 to 5 million gallons.

Other items on the chemical and r lated product export list recording gain in 1937, compared with the preceding year, included naval stores, gums an resins, the value of which increased fro $18,924,000 to $22,141,000; sulfur bo crude and refined, from $10,894,000 $12,088,000; coaltar products, from $1 776,000 to $14,877,000; industrial explo sives, from $2,618,000 to $3,863,000; soap from $2,729,000 to $3,200,000; and toile preparations from $5,346,000 to $5,998,00

Exports of vegetable tanning materia recorded at $1,754,000 in 1937 was approxi mately the same as in the preceding yea but shipments of fertilizers and fertilize materials declined in quantity from 1,649 000 to 1,521,000 tons and in value fro $17,750,000 to $16,954,000, statistics in dicate. This loss was due to smaller ex ports of phosphate rock anlaysis reveal

• S.C.I. MEETING

A meeting of the American Section o the Society of Chemical Industry, joint with the American Chemical Society, wa held February 11th at The Chemists' Club 52 East 41st Street, New York City. Mr James G. Vail was the Chairman. The guest speaker was Mr. William M. Phil lips who gave a "Graphic Presentation o Electroplating Operations."

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Finishing plant chemist desires responsible position. Expert on vats, napthols and other cotton and rayon dyeing. All types of control work and testing. 26 years' experience on yarn and piece goods. Write Box No. 993, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

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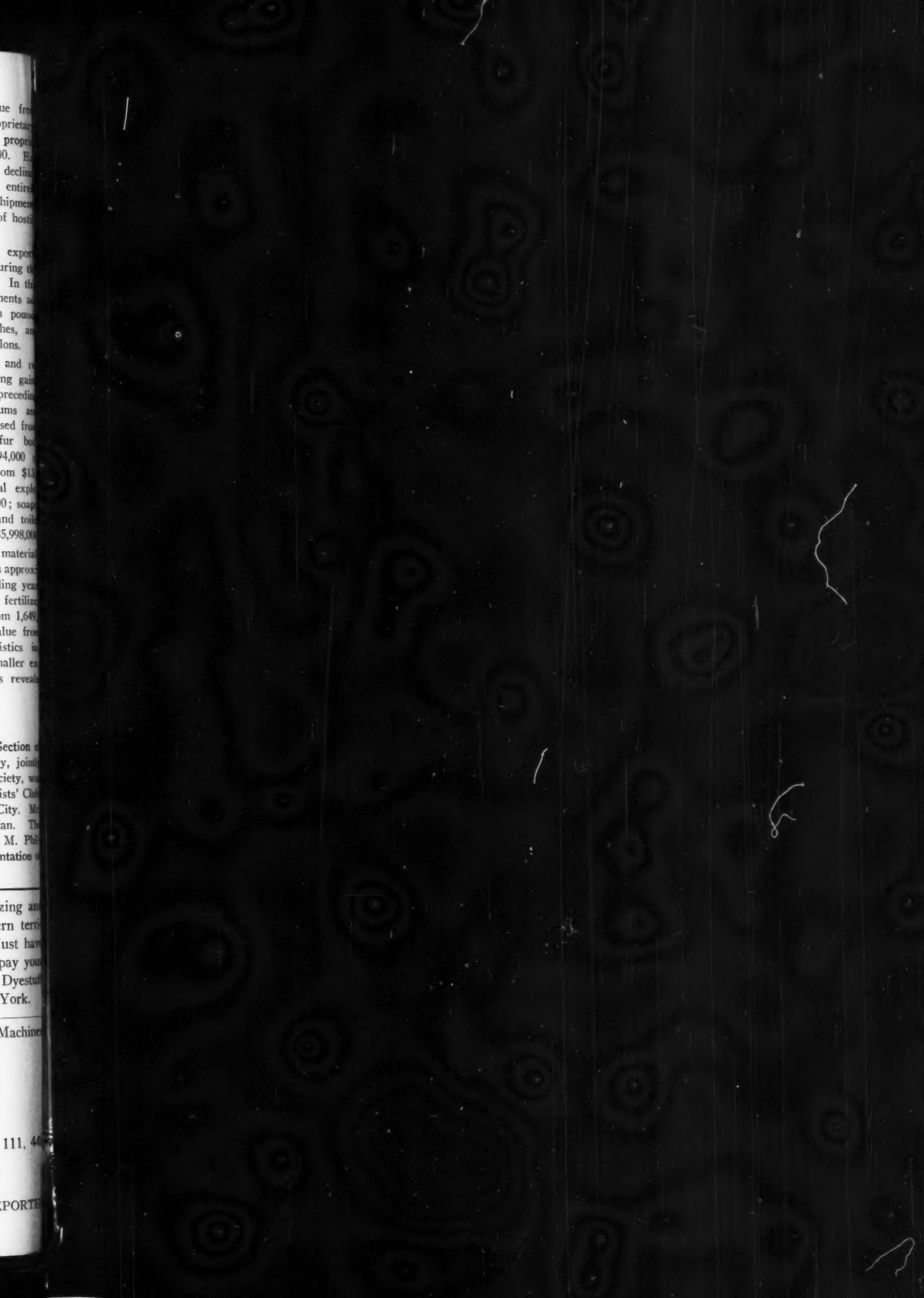
"FOR SALE—3 Smith Drum Laundry Machine 3 Butterworth Laundry Machines
Diameter of drum on 3 machines 34"
Diameter of drum on 2 machines 36"
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Without motors—All in good condition".
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